What is claimed is:

1. An isolated dipeptidylpeptidase, active analog, active fragment, or active modification thereof having amidolytic activity for cleavage of a peptide bond between the second and third amino acids from the N-terminal end of a target polypeptide, wherein the target polypeptide has an aliphatic or an aromatic residue as a substituent on the α-carbon atom of the second amino acid from the N-terminal end of the polypeptide.

2. The dipeptidylpeptidase of claim 1 wherein the dipeptidylpeptidase is isolated from *Porphyromonas gingivalis*.

3. The dipeptidylpeptidase of claim 1 wherein the dipeptidylpeptidase is a serine protease.

4. The dipeptidylpeptidase of claim 1 comprising an amino acid sequence TGGNSGSPV (SEQ ID NO:26).

5. The dipeptidylpeptidase of claim 1 comprising an amino acid sequence TGGNSGSPVF (SEQ ID NO:25).

6. The dipeptidylpeptidase of claim 1 comprising an amino acid sequence selected from the group consisting of SEQ ID NO:3, SEQ ID NO:18, SEQ ID NO:19, SEQ ID NO:20, SEQ ID NO:21, SEQ ID NO:22, SEQ ID NO:23, SEQ ID NO:24, SEQ ID NO:25, and SEQ ID NO:26.

7. The dipeptidylpeptidase of claim 1 comprising an amino acid sequence SEQ ID NO:2.

8. The dipeptidylpeptidase of claim 1 wherein the dipeptidylpeptidase is encoded by a nucleic acid comprising a nucleotide sequence SEQ ID NO:1.

9. An isolated polypeptide comprising an amino acid sequence having a percentage amino acid identity greater than about 40% with SEQ ID NO:2.

10. An isolated nucleic acid comprising a coding sequence encoding a dipeptidylpeptidase, active analog, active fragment, or active modification thereof having amidolytic activity for cleavage of a peptide bond between the second and third amino acids from the N-terminal end of a target polypeptide, wherein the target polypeptide has an aliphatic or an aromatic residue as a substituent on the α-carbon atom of the second amino acid from the N-terminal end of the polypeptide.

11. The nucleic acid of claim 10 wherein the nucleic acid comprises a nucleotide sequence SEQ ID NO:1.

12. The nucleic acid of claim 10 wherein a complement of the nucleic acid hybridizes to SEQ ID NO:1 under hybridization conditions of 0.5 M phosphate buffer, pH 7.2, 7% SDS, 10 mM EDTA, at 68°C, followed by three for 20 minutes washes in 2x SSC, and 0.1% SDS, at 65°C, wherein at least about 20 nucleotides of the complement hybridize.

13. An isolated nucleic acid encoding a polypeptide, wherein the polypeptide comprises an amino acid sequence having a percentage amino acid identity greater than about 40% with SEQ ID NO:2.

14. A method of identifying an inhibitor of a dipeptidylpeptidase, active analog, active fragment, or active modification thereof, comprising identifying a compound that inhibits the amidolytic activity of the dipeptidylpeptidase by incubating the dipeptidylpeptidase with the compound under conditions that promote amidolytic activity of the dipeptidylpeptidase and determining if the amidolytic activity of the

dipeptidylpeptidase is inhibited relative to the amidolytic activity in the absence of the compound.

15. A method of reducing growth of a bacterium comprising inhibiting a dipeptidylpeptidase, active analog, active fragment, or active modification thereof, by contacting the dipeptidylpeptidase with an inhibitor of the dipeptidylpeptidase.

16. The method of claim 15 wherein the dipeptidylpeptidase is a serine protease.

17. A method for protecting an animal from a periodontal disease caused by *Porphyromonas gingivalis* comprising administering to the animal an inhibitor of dipeptidylpeptidase, wherein the disease is selected from the group consisting of gingivitis and periodontitis.

18. The method of claim 17 wherein the inhibitor is administered by a method selected from the group consisting of subgingival application and controlled release delivery.

19. An immunogenic composition comprising an isolated dipeptidylpeptidase, an antigenic analog, an antigenic fragment, or an antigenic modification thereof having amidolytic activity for cleavage of a peptide bond present in a target polypeptide, the peptide bond being located between the second and third amino acids from the N-terminal end of the target polypeptide, wherein the second amino acid from the N-terminal end of the polypeptide has an aliphatic or an aromatic residue as a substituent on the α-carbon atom.

20. The composition of claim 19 wherein the dipeptidylpeptidase is a serine protease.

21. The composition of claim 19 wherein the second amino acid is selected from the group consisting of alanine, phenylalanine, isoleucine, and leucine.

22. The immunogenic composition of claim 19 further comprising an adjuvant.

23. A composition comprising an inhibitor of an isolated dipeptidylpeptidase and a pharmaceutically acceptable carrier.